Miller
The Power of Blue.

OM-189 530C
September 2000

## Processes

Submerged (SAW) Welding

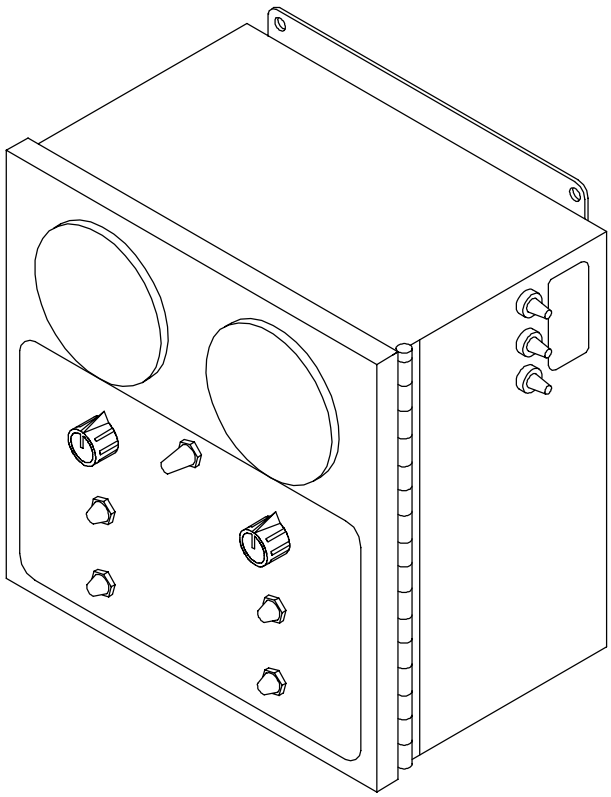
MIG (GMAW) Welding

## Description

Submerged Arc Controller For Automatic Welding

CE

# VL–M4



**50, 60 Hz**

Visit our website at
www.MillerWelds.com

# OWNER'S MANUAL

# From Miller to You

*Thank you* and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

*Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.*

Miller® *The Power of Blue.*

## ⚠ WARNING

**This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

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# *Declaration of Conformity for European Community (CE) Products*

| **NOTE** ☞ | *This information is provided for units with CE certification (see rating label on unit).* |
|---|---|

*Manufacturer's Name:* Miller Electric Mfg. Co.

*Manufacturer's Address:* 1635 W. Spencer Street
Appleton, WI 54914 USA

*Declares that the product:* **VL-M4**

*conforms to the following Directives and Standards:*

**Directives**

Low Voltage Directive: 73/23/EEC

Electromagnetic Compatibility (EMC) Directive: 89/336/EEC

Machinery Directives: 89/392/EEC, 91/368/EEC, 93/C 133/04, 93/68/EEC

**Standards**

Arc Welding Equipment Part I: Welding Power Sources: IEC 974-1
(April 1997 – Draft Revision)

Arc Welding Equipment: Wirefeed Systems: IEC 974-5
(May 1997 – Draft )

Degrees of Protection Provided By Enclosures (IP Code): IEC 529:1989

Insulation Coordination For Equipment With Low-Voltage Systems:
Part I: Principles, Requirements and Tests: IEC 664-1: 1992

Electromagnetic Compatibility, (EMC): EN 50199

*European Contact:* Mr. Luigi Vacchini, Managing Director
MILLER Europe S.P.A.
Via Privata Iseo
20098 San Giuliano
Milanese, Italy

*Telephone:* 39(02)98290-1
*Fax:* 39(02)98281-552

# SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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## 1-1. Symbol Usage

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

**▲Marks a special safety message.**

*Means "Note"; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

## 1-2. Arc Welding Hazards

**▲The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.**

**▲Only qualified persons should install, operate, maintain, and repair this unit.**

**▲During operation, keep everybody, especially children, away.**

### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

### SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

### FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

## ARC RAYS can burn eyes and skin.

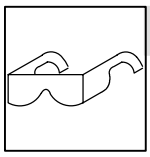
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather and wool) and foot protection.

## WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



## FLYING METAL can injure eyes.

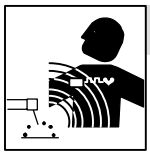
- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

## BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

## HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.



## MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

## NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

## CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

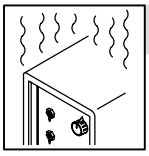
## 1-3. Additional Symbols For Installation, Operation, And Maintenance

### FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

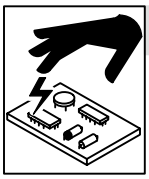
### FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



### OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



### STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

### MOVING PARTS can cause injury.

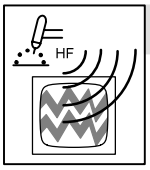
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

### WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

### MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.




### H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

### ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

## 1-4. Principal Safety Standards

*Safety in Welding and Cutting*, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

*Safety and Health Standards*, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

*Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances*, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

*Code for Safety in Welding and Cutting*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

*Safe Practices For Occupation And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

*Cutting And Welding Processes*, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

## 1-5. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

**About Pacemakers:**

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

# SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION

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## 1-1. Signification des symboles

Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

**Identifie un message de sécurité particulier.**

*Signifie NOTA ; n'est pas relatif à la sécurité.*

Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

## 1-2. Dangers relatifs au soudage à l'arc

**Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-4. Veuillez lire et respecter toutes ces normes de sécurité.**

**L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

**Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**

### UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

### Il y a DU COURANT CONTINU IMPORTANT dans les convertisseurs après la suppression de l'alimentation électrique.

- Arrêter les convertisseurs, débrancher le courant électrique, et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie entretien avant de toucher les pièces.

### LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- A l'intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

## LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

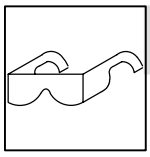
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (cuir ou laine) et une protection des pieds.

## LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



## DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.

## LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.

## DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues
- Prévoir une période de refroidissement avant d'utiliser le pistolet ou la torche.

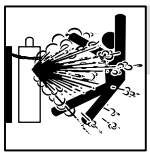
## LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

## LE BRUIT peut affecter l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.



## Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publications P-1 CGA énumérées dans les normes de sécurité.

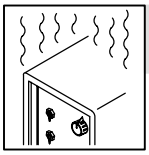
## 1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

### Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infllammables.
- Ne pas installer l'appareil à proximité de produits inflammables
- Ne pas surcharger l'installation électrique – s"assurer que l'alimentation est correctement dimensionné et protégé avant de mettre l'appareil en service.

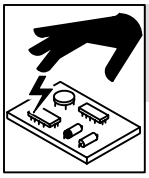
### LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



### L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement, respecter le cycle opératoire nominal.
- Réduire le courant ou le cycle opératoire avant de recommancer le soudage.
- Ne pas obstruer les passages d'air du poste.



### LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.

### DES ORGANES MOBILES peuvent provoquer des blessures.

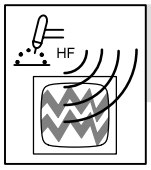
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

### LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gachette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.

### DES ORGANES MOBILES peuvent provoquer des blessures.

- Rester à l'écart des organes mobiles comme le ventilateur.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.




### LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute frequence peut provoquer des interférences avec les équipements de radio–navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.

### LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

### LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

## 1-4. Principales normes de sécurité

*Safety in Welding and Cutting,* norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

*Safety and Health Sandards,* OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

*Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances,* norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

*National Electrical Code,* NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

*Safe Handling of Compressed Gases in Cylinders,* CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

*Règles de sécurité en soudage, coupage et procédés connexes,* norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

*Safe Practices For Occupation And Educational Eye And Face Protection*, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

*Cutting and Welding Processes,* norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

## 1-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.

2 Mettre tous les câbles du côté opposé de l'opérateur.

3 Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.

4 Garder le poste de soudage et les câbles le plus loin possible de vous.

5 Relier la pince de masse le plus près possible de la zone de soudure.

**Consignes relatives aux stimulateurs cardiaques :**

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci–dessus.

# SECTION 2 – DEFINITIONS

## 2-1. Warning Label Definitions

A. Warning! Watch Out! There are possible hazards as shown by the symbols.

B. Drive rolls can injure fingers.

C. Welding wire and drive parts are at welding voltage during operation – keep hands and metal objects clear.

1 Electric shock can kill.

1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.

1.2 Protect yourself from electric shock by insulating yourself from work and ground.

1.3 Disconnect input plug or power before working on machine.

2 Breathing welding fumes can be hazardous to your health.

2.1 Keep your head out of the fumes.

2.2 Use forced ventilation or local exhaust to remove the fumes.

2.3 Use ventilating fan to remove fumes.

3 Welding sparks can cause explosion or fire.

3.1 Keep flammables away from welding. Don't weld near flammables.

3.2 Welding sparks can cause fires. Have a fire extinguisher nearby and have a watch person ready to use it.

3.3 Do not weld on drums or any closed containers.

4 Arc rays can burn eyes and injure skin.

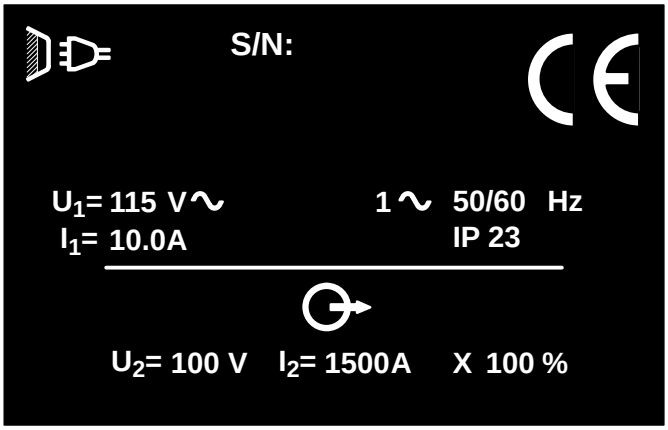
4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.

5 Become trained and read the instructions before working on the machine or welding.

6 Do not remove or paint over (cover) the label.

## 2-2. Rating Label For CE Products

*Label located on bottom of unit.*

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## 2-3. Symbols And Definitions

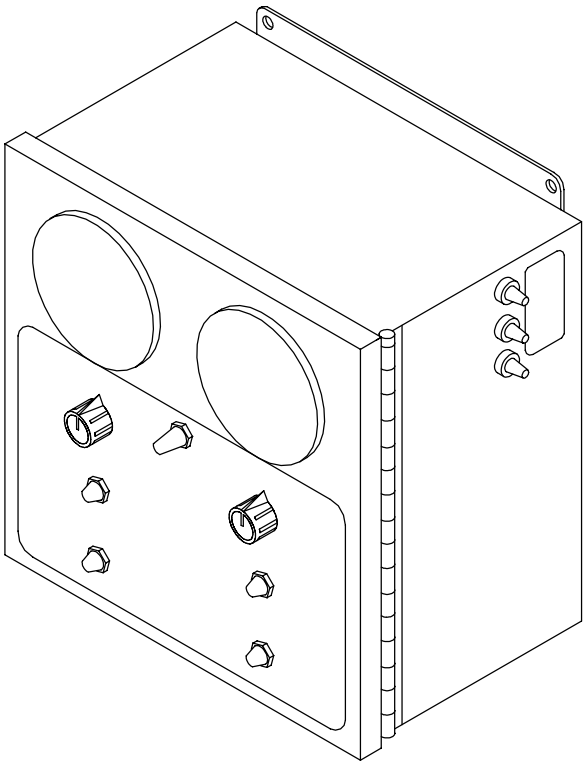
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | Amperes | V | Volts | ∿ | Alternating Current | X | Duty Cycle |
| IP | Degree Of Protection | Hz | Hertz | $I_1$ | Primary Current | | Wire Feed |
| | Jog | | Output | $I_2$ | Rated Current | | Line Connection |
| | Increase | | Start of Action | | Stop of Action | 1∿ | Single Phase |
| $U_1$ | Primary Voltage | $U_2$ | Load Voltage | | Off | | Input |
| % | Percent | | Read Instructions | | | | |

# SECTION 3 – SPECIFICATIONS

## 3-1. Weld Control

| Specification | Description |
|---|---|
| Type Of Input Power From Welding Power Source | Single-Phase 115 Volts AC, 10 Amperes, 50/60 Hertz |
| Welding Power Source Type | Constant Current (CC), Constant Voltage (CV), AC Or DC, With Contactor And Remote Capabilities |
| Welding Processes | Gas Metal Arc (GMAW) And Submerged Arc Welding (SAW) |
| Overall Dimensions Including Knobs, Receptacles, Etc. | Weld Control — Length: 11.5 in (292 mm); Width: 11.25 in (286 mm); Height: 7 in (178 mm)<br>Shunt Control — Length: 14 in (356 mm); Width: 8.75 in (222 mm); Height: 4 in (102 mm) |
| Weight | Weld Control — Net: 18 lb (8.2 kg)<br>Shunt Control — Net: 10.2 lb (4.6 kg) |
| Weld Voltage And Amperage Capacity (AC Or DC) | 0 To 100 Volts<br>0 To 1500 Amperes |

## 3-2. Description



802 530

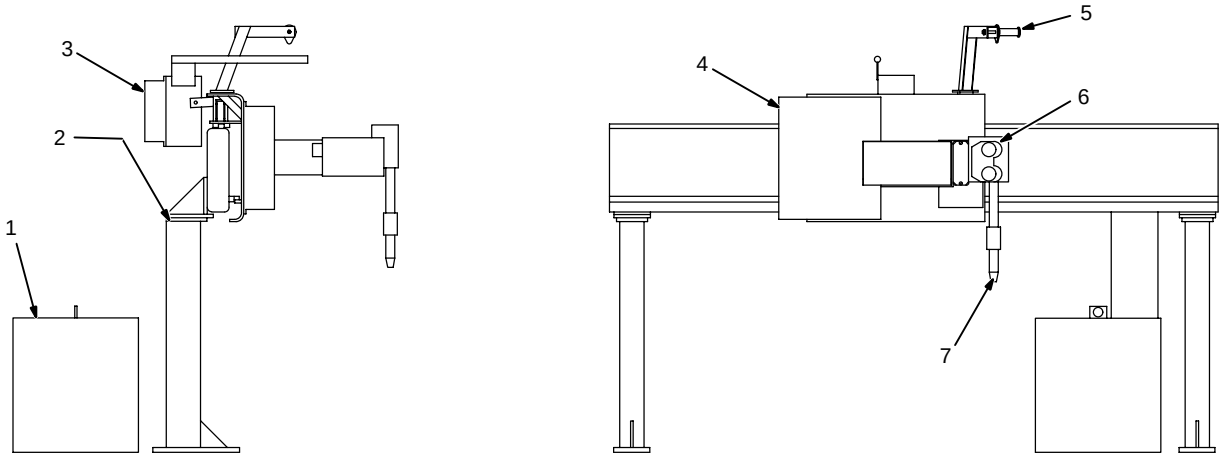
This weld control is designed to automatically cycle welding events while maintaining constant wire feed speed. This unit can be used with constant current, constant voltage, AC or DC welding power sources having remote contactor control and output control capabilities for Submerged Arc Welding (SAW). Normally open relay contacts that work in conjunction with the weld cycle are available to interface with other equipment (such as fixtures and flux valves). See Section 4-6 and 4-7 for connection information on TE1.

For information on the wire drive assembly, see Owner's Manual supplied with the assembly. A current sensing shunt control is also provided with the weld control.

# SECTION 4 – INSTALLATION

## 4-1. Typical Equipment Location

1 Welding Power Source
2 Side Beam
3 Current Sensing Shunt Control
4 Weld Control
5 Spool Support
6 Wire Drive Assembly
7 Automatic Welding Gun

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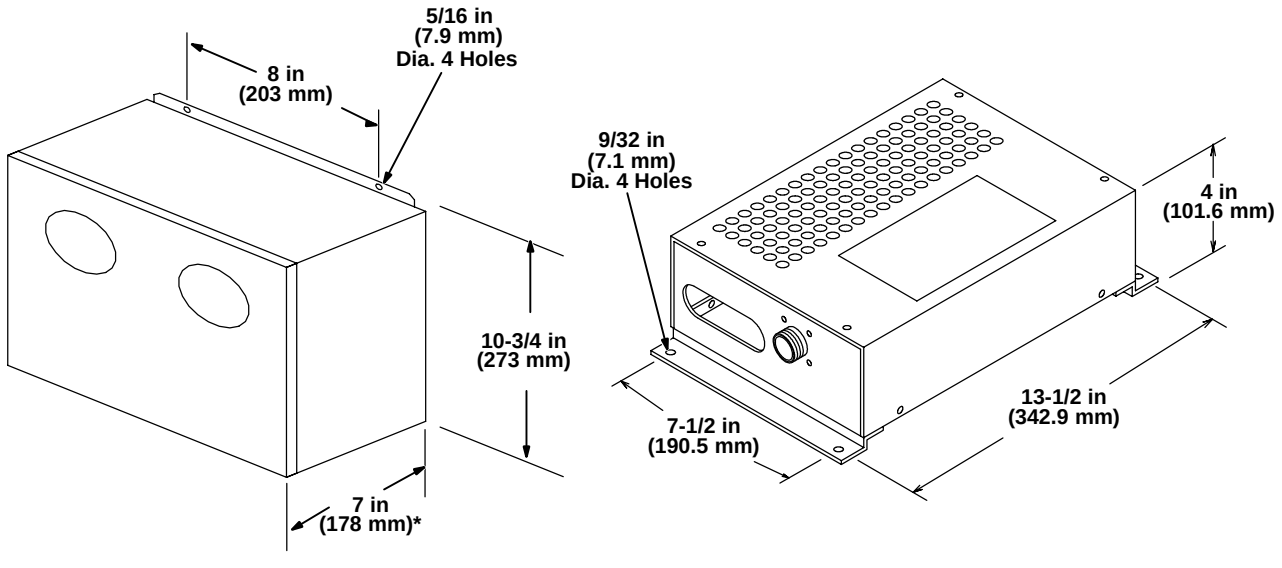
## 4-2. Mounting Hole Layout




*** Includes front panel knobs**

ST-083 354-C

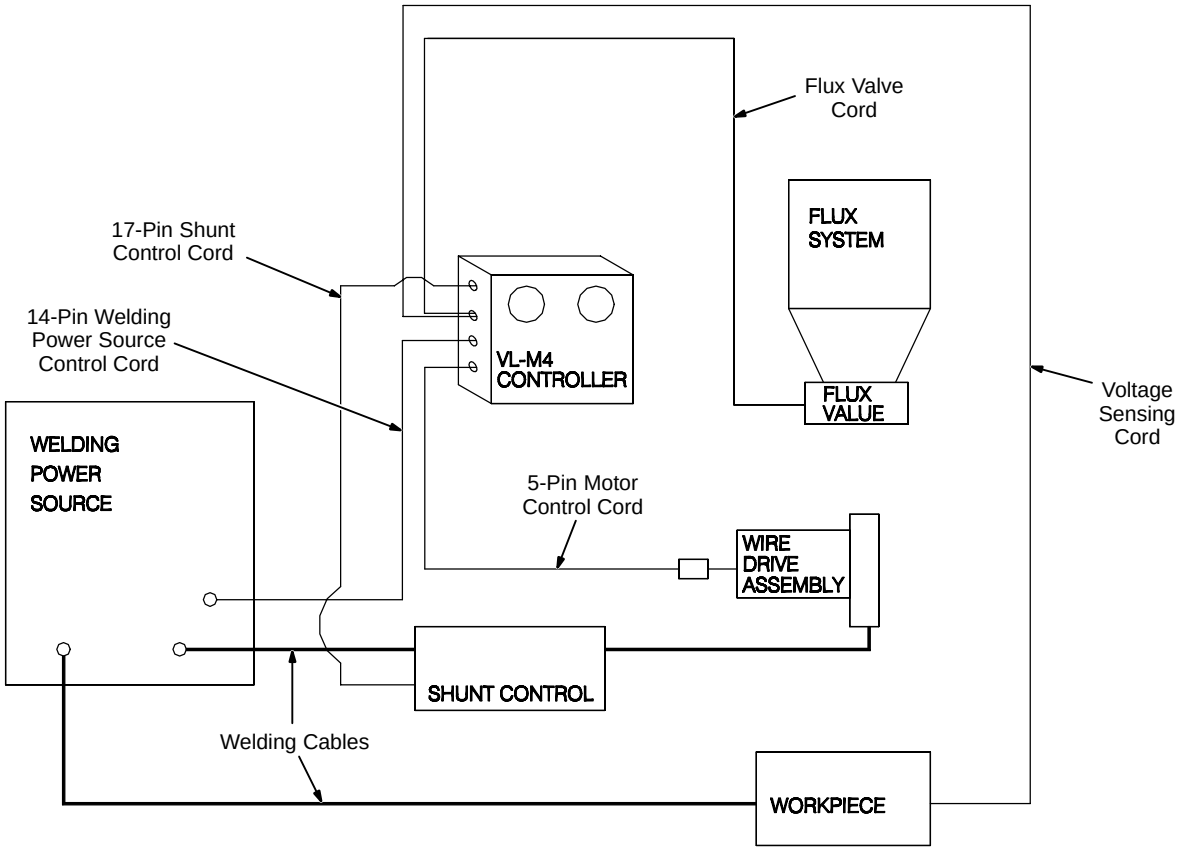
## 4-3. Connection Diagram

**Note** ☞ *Customer must supply wire drive assembly and drive rolls, gun, welding wire, weld cables, and flux for the desired application.*

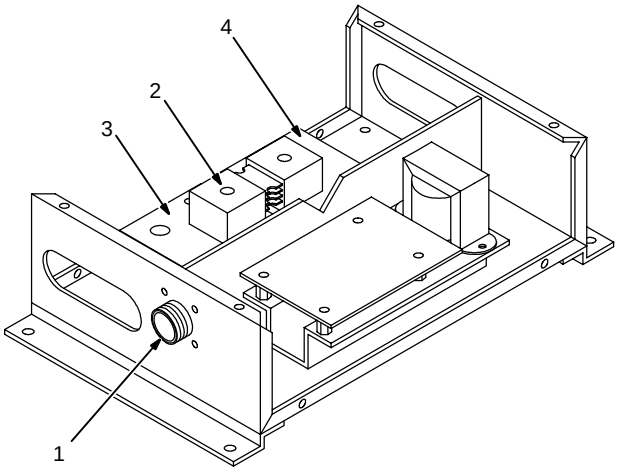
This unit is supplied with the 5-pin, 14-pin, and 17-pin cords. Select the proper cord and make each of the connections shown.

☞ *For non-Miller power sources and wire drive motors, Terminal Strip TE2 can be used for hookup (See Sections 3-9 and 3-10).*

Route voltage sense lead through strain relief on user access hole. Connect one end to terminal 21 on TE1 (see Section 4-6). Connect other end of voltage sensing lead to the workpiece.



## 4-4. Connecting Shunt Control




**▲Turn Off welding power source and weld control.**

Select and prepare proper size and length weld cables according to the welding power source Owner's Manual. Remove cover from shunt control.

1 17-Pin Receptacle

2 Shunt

3 Bus Bar On Shunt

4 Bus Bar On Shunt

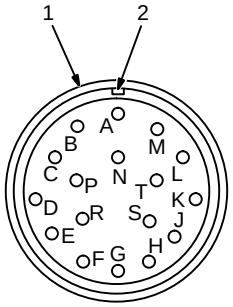
Route and connect a weld cable from selected weld output terminal on welding power source to one bus bar on shunt (see Section 4-3).

Route and connect another weld cable from remaining bus bar on shunt to wire drive assembly (see Section 4-3).

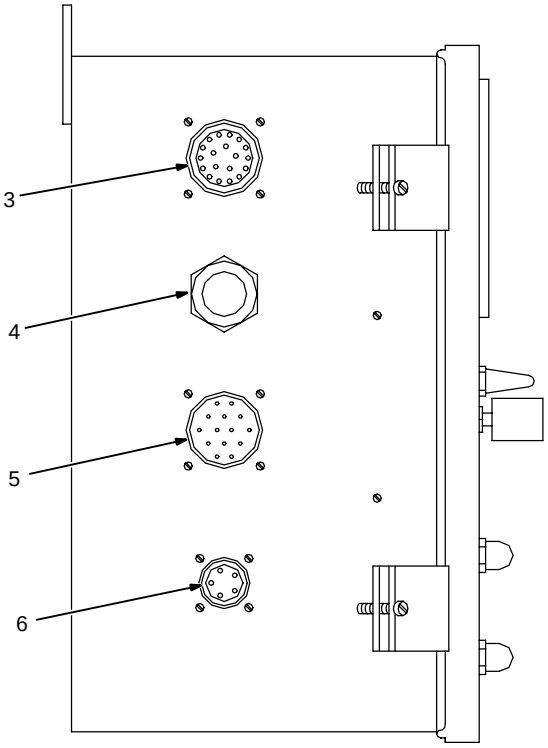
Reinstall cover onto shunt control.

Ref. ST-083 353-C

## 4-5. Left Side Panel Connections




**Example Receptacle**




1 Receptacle

2 Keyway

3 17-Pin Receptacle: Connection to Shunt Control

4 For Customer Use: Connections To Terminal Strips, Flux Valve, etc.

Route incoming cables through this strain relief prior to making connections to internal terminal strips.

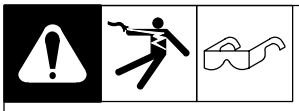
5 14-Pin Receptacle: Connection To Welding Power Source.

6 5-Pin Receptacle: Connection to Wire Drive Motor

To connect matching interconnecting cord to one of the above receptacles, align keyway, insert plug, and tighten threaded collar. Connect remaining end of cord to matching receptacle on applicable equipment.

Ref. 802 531

## 4-6. Terminal Strip TE1 Connections



**▲Turn Off welding power source and disconnect input power before opening access door.**

1 Access Door

Loosen securing screws (2) and open access door.

2 Terminal Strip TE1

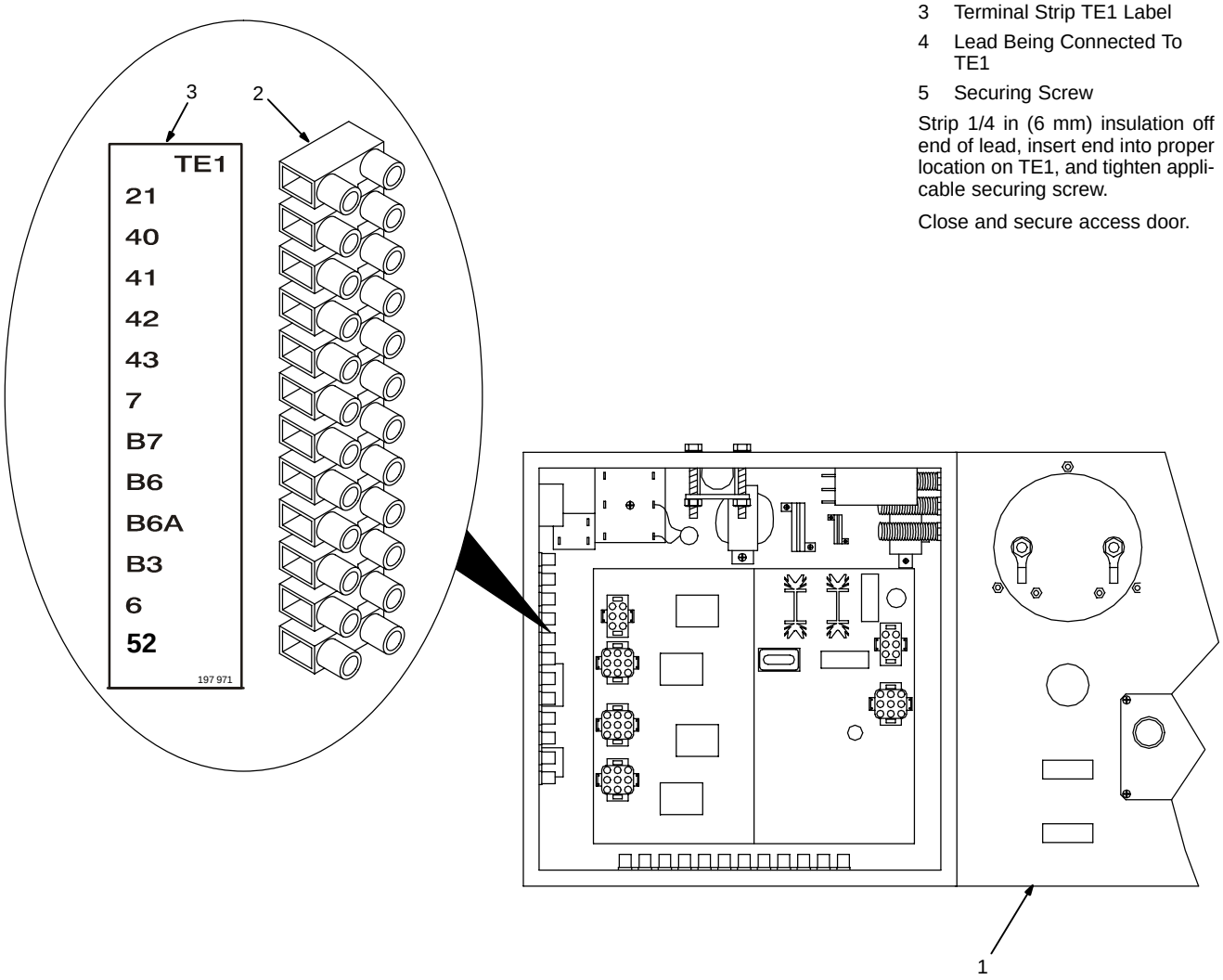
3 Terminal Strip TE1 Label

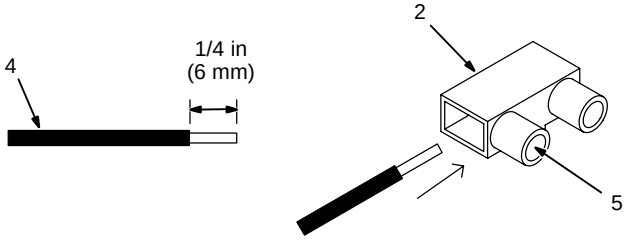
4 Lead Being Connected To TE1

5 Securing Screw

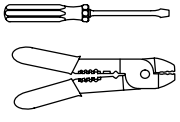
Strip 1/4 in (6 mm) insulation off end of lead, insert end into proper location on TE1, and tighten applicable securing screw.

Close and secure access door.




Tools Needed:



Ref. ST-049 258-C / ST-801 882-A / Ref. ST-802 555

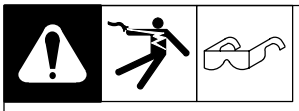
## 4-7. Terminal Strip TE1 Connection Information

| Terminal Number | Receptacle Location | Function Information |
|---|---|---|
| 21 | M on 17-Pin | Voltage sense lead input. |
| 40 | L on 17-Pin | Normally open contacts with respect to pin T; closes when an arc is detected. |
| 41 | T on 17-PIn | Normally open contacts with respect to pin L; closes when an arc is detected. |
| 42 | P on 17-Pin | + 24 volts dc for flux valve with respect to pin S when an arc is detected. |
| 43 | S on 17-PIn | Circuit common for flux valve. |
| 7 | Not Used | |
| B7 | Not Used | |
| B6 | Not Used | |
| B6A | Not Used | |
| B3 | Not Used | |
| 6 | Not Used | |
| 52 | – | 115 VAC with respect to terminal 32 on terminal TE2; used to energize a flux valve. |

## 4-8. Remote 14 Receptacle RC2 Information

| REMOTE 14 | Socket | User Accessible Via TE2 Terminal # | Socket Information |
|---|---|---|---|
| **Contactor Control** | A | 2 | 24 volts ac from welding power source (present whenever power source is On). |
| | B | 4 | Normally open set of relay contacts connect A to B when START is pressed. |
| **Remote Output Control** | C | 77 | Remote command reference from welding power source. |
| | D | 75 | Remote circuit common. |
| | E | 76 | Output command signal to welding power source. |
| **Electrical Input Power** | G | 32 | Circuit common for 24 and 115 volts ac circuits. |
| | I | 31 | 115 volts ac from welding power source (present whenever welding power source is On). |
| **GND** | K | 33 | Chassis common. |

## 4-9. Terminal Strip TE2 Connections



**▲Turn Off welding power source and disconnect input power before opening access door.**

1 Access Door

Loosen securing screws (2) and open access door.

2 Terminal Strip TE2

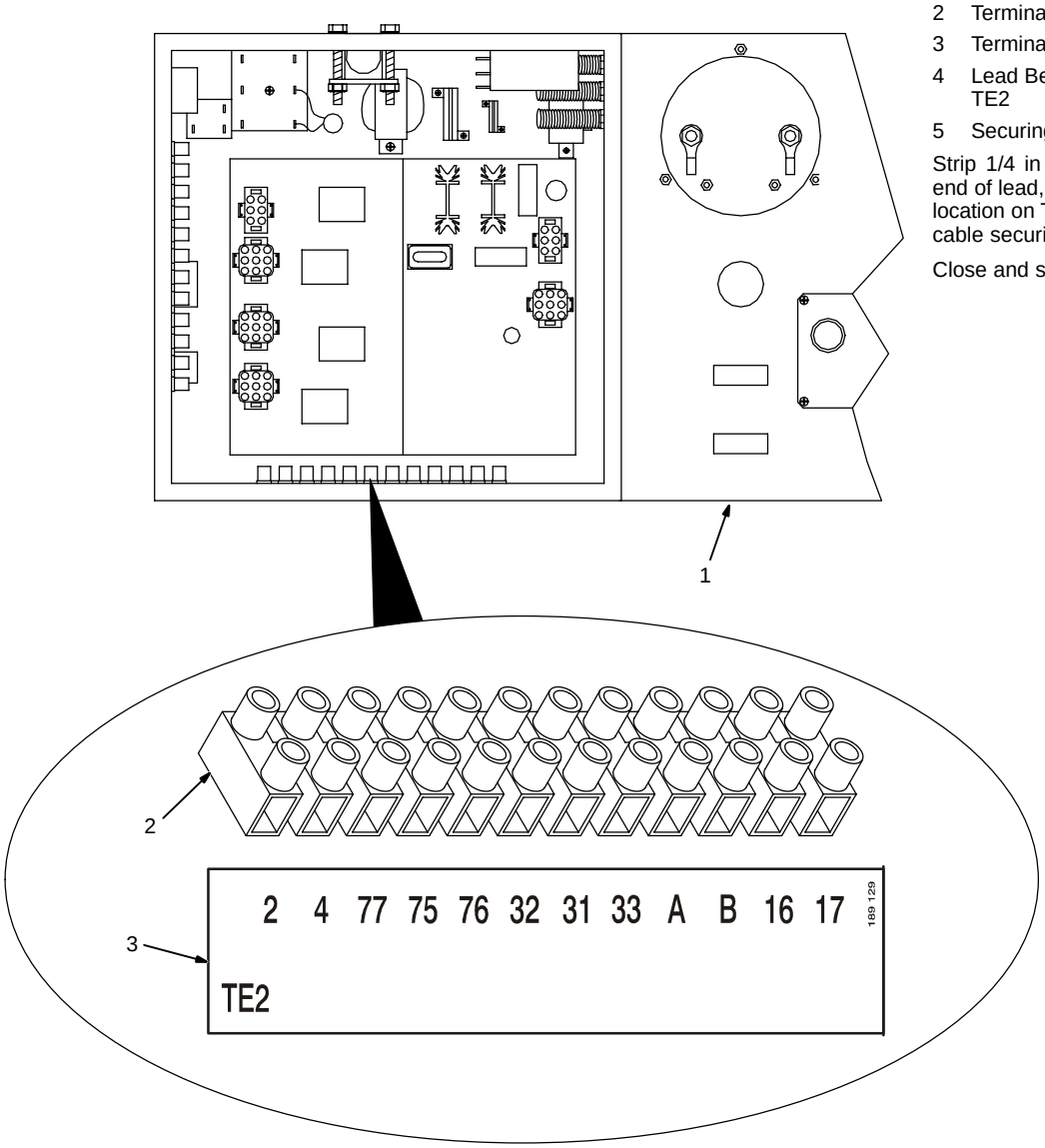
3 Terminal Strip TE2 Label

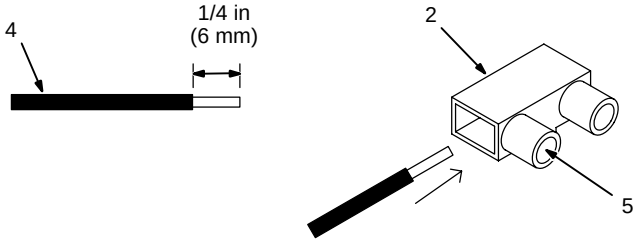
4 Lead Being Connected To TE2

5 Securing Screw

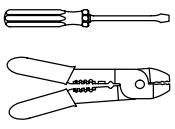
Strip 1/4 in (6 mm) insulation off end of lead, insert end into proper location on TE2, and tighten applicable securing screw.

Close and secure access door.




Tools Needed:



Ref. ST-802 555 / Ref. ST-049 258-C / ST-801 882-A

## 4-10. Terminal Strip TE2 Connection Information

| Terminal Number | Receptacle Location | Function Information |
|---|---|---|
| 2 | A on 14-Pin | A normally open set of relay contacts connect terminal 2 to terminal 4 when START is pressed. |
| 4 | B on 14-Pin | |
| 77 | C on 14-Pin | Remote command reference from welding power source. |
| 75 | D on 14-Pin | Remote circuit common. |
| 76 | E on 14-Pin | Output command to welding power source. |
| 32 | G on 14-Pin | Circuit common for 24 and 115 volts ac circuits. |
| 31 | I on 14-Pin | 115 volts ac from welding power source (present whenever welding power source is on). |
| 33 | K on 14-Pin | Chassis ground. |
| A | A on 5-Pin | To motor armature (115 volts dc motor). |
| B | B on 5-Pin | To motor armature (115 volts dc motor). |
| 16 | C on 5-Pin | To motor field. |
| 17 | D on 5-Pin | To motor field. |

## 4-11. Remote 17 Receptacle RC1 Information

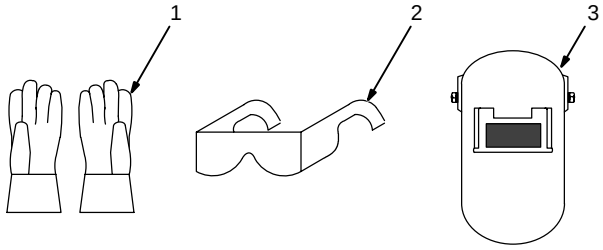
| REMOTE 17 | Socket | User Accessible Via TE1 Terminal # | Socket Information |
|---|---|---|---|
| **115 Volts AC** | A | — | 115 volts ac output protected by Fuse F2. |
| | B | — | Circuit common for 115 volts ac. |
| **GND** | C | — | Chassis ground. |
| **Input Signals For Ammeter And Voltmeter** | D | — | Input signal from shunt control to positive voltmeter terminal. |
| | E | — | Circuit common for ammeter and voltmeter. |
| | F | — | Input signal from shunt control to positive ammeter terminal. |
| **Arc Detect** | G | — | A normally open set of contacts in the shunt control close when an arc is detected and connect G to H to signal the motor board that an arc was established. |
| | H | — | |
| | L | 40 | A normally open set of contacts in the shunt control close when an arc is detected and connect L to T. These points are user accessible through terminal strip TE1. |
| | T | 41 | |
| | P | 42 | +24 volts dc for a flux valve is present on P with respect to S when an arc is detected. These points are user accessible through terminal strip TE1. |
| | S | 43 | |
| **Voltage Sensing** | K | — | Electrode voltage is picked up through shunt control and input to this pin. |
| | M | 21 | Volt sense lead from work connection is output on this pin to shunt control. |

## 4-12. Remote 5 Receptacle RC3 Information

| REMOTE 5 | Socket | User Accessible Via TE2 Terminal # | Socket Information |
|---|---|---|---|
| **Wirefeed Drive Motor Hookups** | A | A | To – motor armature (115 volts dc motor). |
| | B | B | To + motor armature (115 volts dc motor). |
| | C | 16 | To motor field. |
| | D | 17 | To motor field. |
| | E | 33 | Chassis common. |

# SECTION 5 – OPERATION

## 5-1. Safety Equipment




Wear the following while welding:

1 Dry, Insulating Gloves

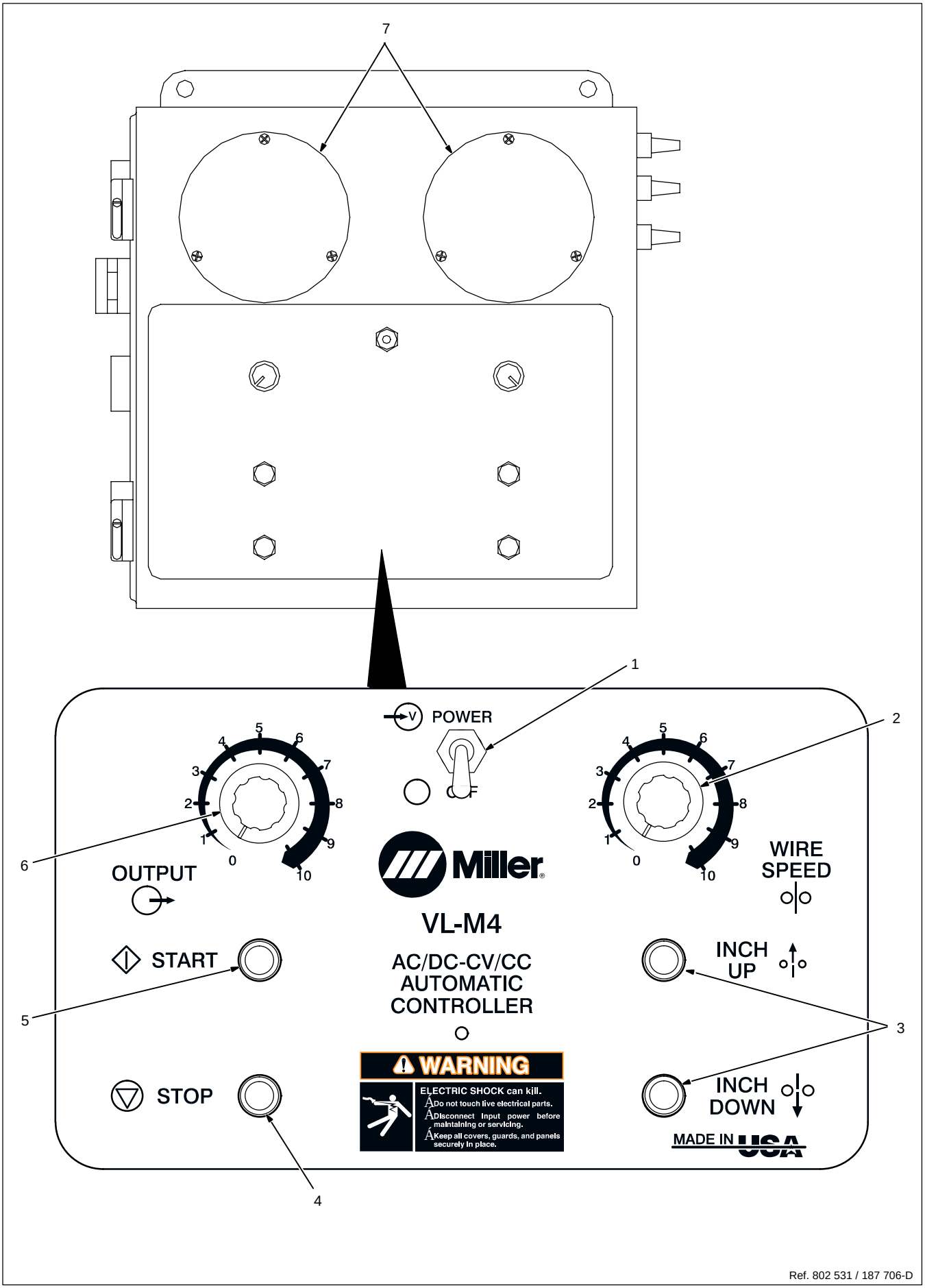
2 Safety Glasses With Side Shields

3 Welding Helmet With Correct Shade Of Filter (See ANSI Z49.1)

sb3.1 1/94

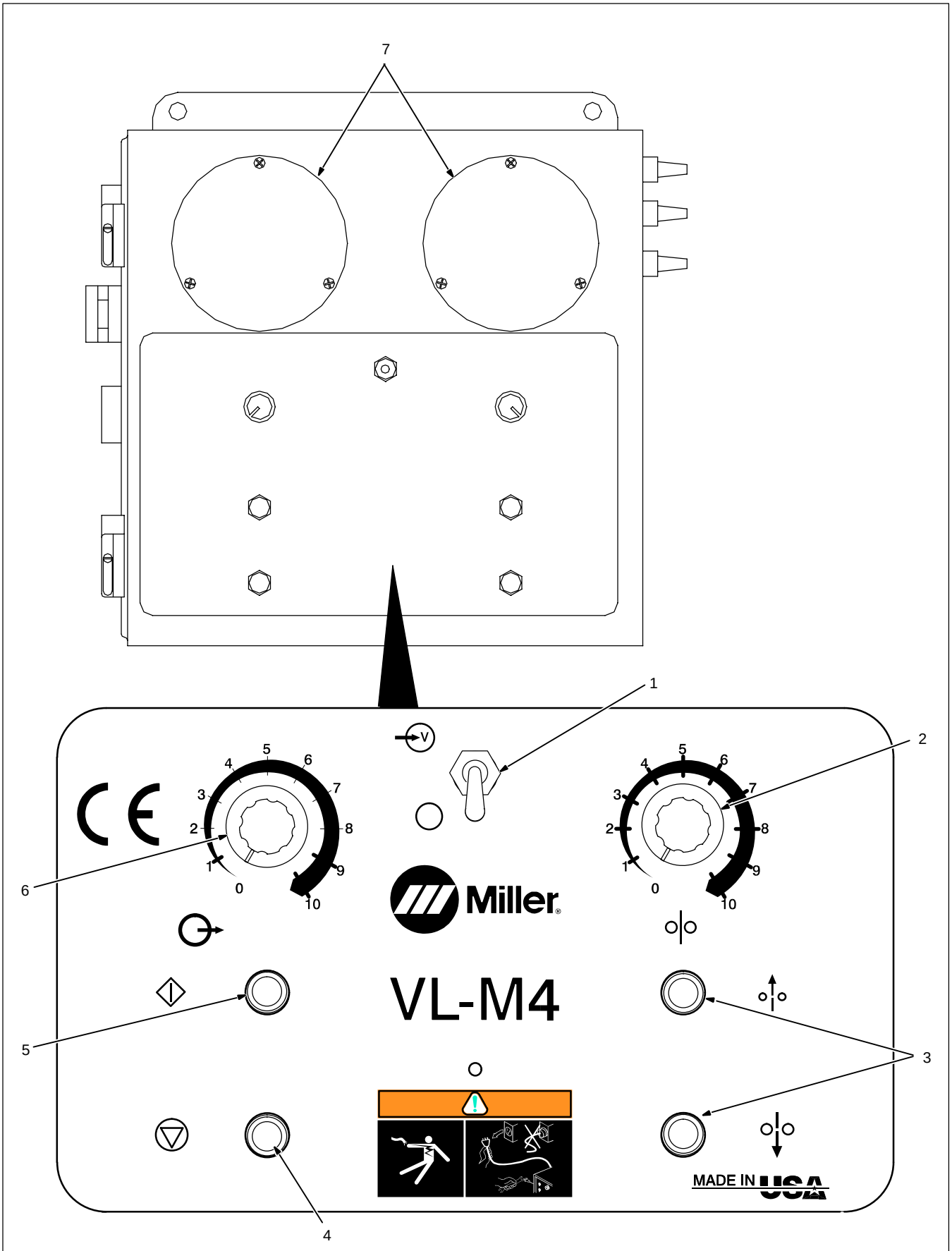
## 5-2. Front Panel Controls

## A. For Non CE Units (Use With Section C)




Ref. 802 531 / 187 706-D

**B. For CE Units (Use With Section C)**




ref. 802 531 / 196 228

## C. Description Of Controls (Use With Sections A And B)

1 Power Switch

Turn this switch ON to energize the VL-M4 Controller. For this unit to operate, 115 vac must be supplied to this controller on pins G and I of the 14-pin receptacle or on terminals 31 and 32 of terminal strip TE2. Turn switch OFF to shut down the controller.

2 Wire Speed Control

This control adjusts the rate or speed at which welding wire is fed into the weld.

3 Inch Up/ Inch Down Switches

These Inch or Jog switches are momentary push buttons which energize only the drive motor allowing for a cold wire jog. The welding wire jogs at the rate set by the Run-In Speed Control. To advance the wire out of the gun, press the Inch Down switch. To retract the wire into the gun, press the Inch Up switch.

4 Stop Switch

Press the Stop button to end the weld cycle. Pressing this button initiates the Burnback delay timer and the Burnback portion of the weld cycle.

5 Start Switch

After pressing the Start button, flux valve relay CR5 energizes immediately and supplies 115 VAC to an external flux valve via terminal 52 on terminal strip TE1 and terminal 32 on TE2. Preflux time can be adjusted by the knob on CR6. After this timer times out, the flux valve relay remains energized and the weld cycle begins. The weld continues until the stop button is pressed.

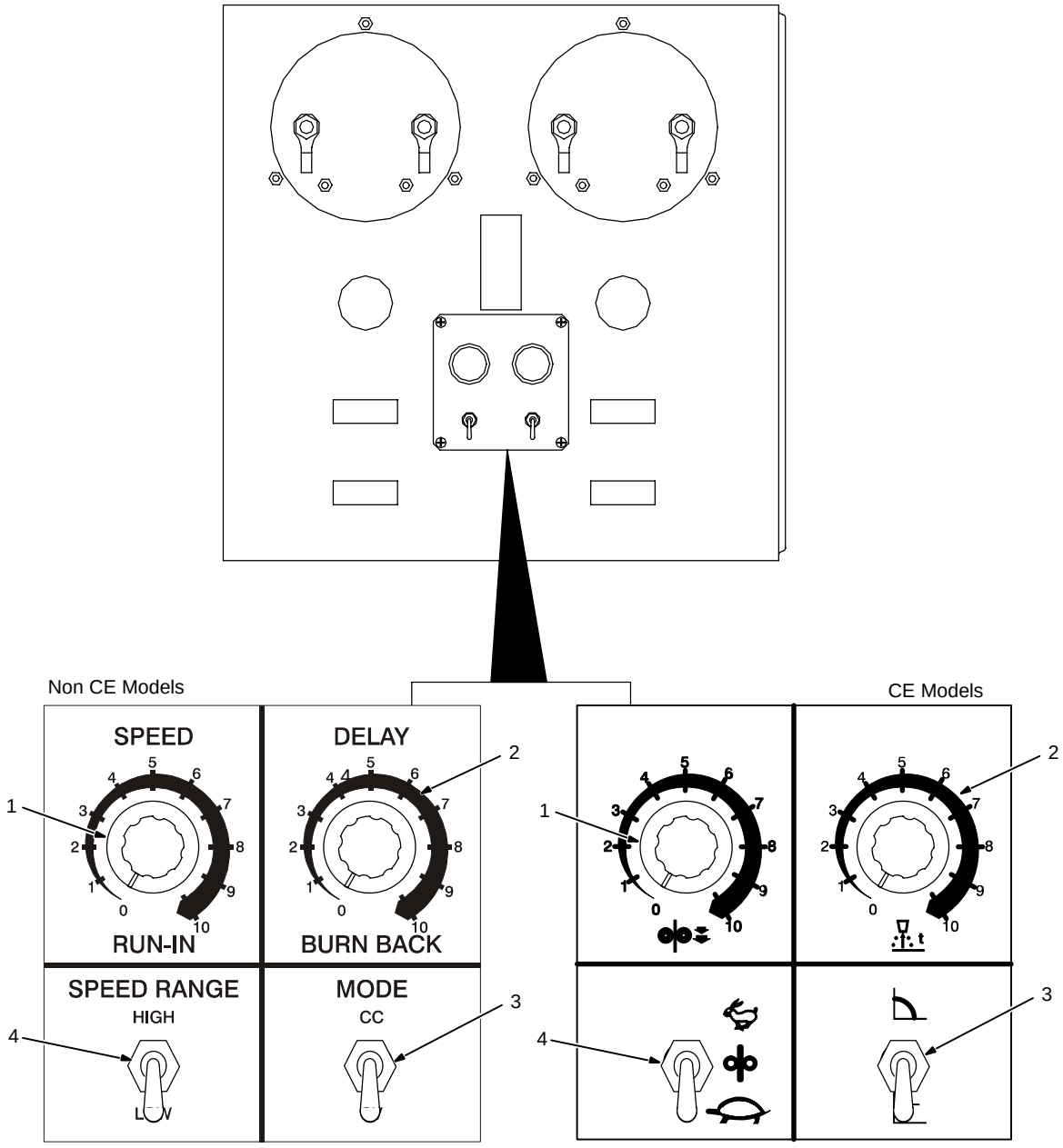
6 Output Control

This control adjusts the output of the welding power source. If using a CV (Constant Voltage) machine, this control adjusts voltage. If using a CC (Constant Current) machine, this control adjusts current.

7 Weld Meters

The meters are provided to monitor the welding operation (either AC or DC). They are not intended for exact voltage or amperage measurements. The Voltage Sense lead must be properly connected for the voltmeter to receive a signal and function correctly.

## 5-3. Inside Panel Controls




Ref. 802 531

1 Run-In Speed Control

This control sets the wirefeed speed that applies between the time the Start button is pressed and an arc is established. After arc initiation, the wirefeed speed is set by the front panel wire speed control. The Run-In Speed control acts independently of the other speed control and therefore can be set above or below the value set by the other control.

2 Burnback Control

This 0 to 1.0 second adjustable control allows setting of the time the wire remains electrically energized after the drive motor stops. The Burnback timer starts after the Stop button is pressed. By adjusting the control properly, the wire neither freezes in the weld puddle nor in the contact tube of the gun. If the wire freezes in the puddle, increase the burnback time. If the wire freezes in the contact tube, decrease the burnback time.

3 Mode Switch

Use this switch to enable or disable the voltage feedback to the motor control board. Voltage feedback is disabled in the CV Mode.

4 Welding Wirefeed Speed Range Switch

This switch selects the overall coarse wire speed range that can be adjusted with the front panel wire speed control.

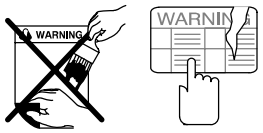
# SECTION 6 – MAINTENANCE & TROUBLESHOOTING

## 6-1. Routine Maintenance

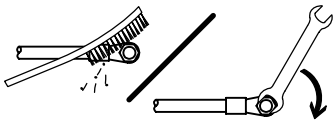
**▲Disconnect power before maintaining.**

### 3 Months

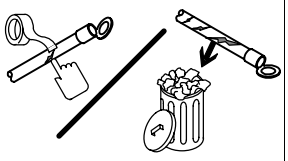
Replace unreadable labels.



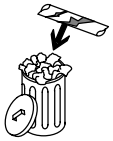

Clean and tighten weld terminals.



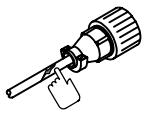
Repair or replace cracked weld cable.



Replace cracked parts.

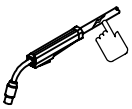


Check 14-pin cord.



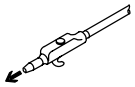
Check gas hose and fittings.

Check gun cable.

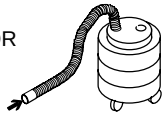


### 6 Months

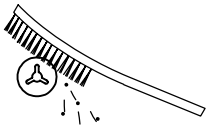
Blow out or vacuum inside. During heavy service, clean monthly.



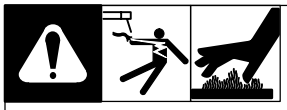
OR

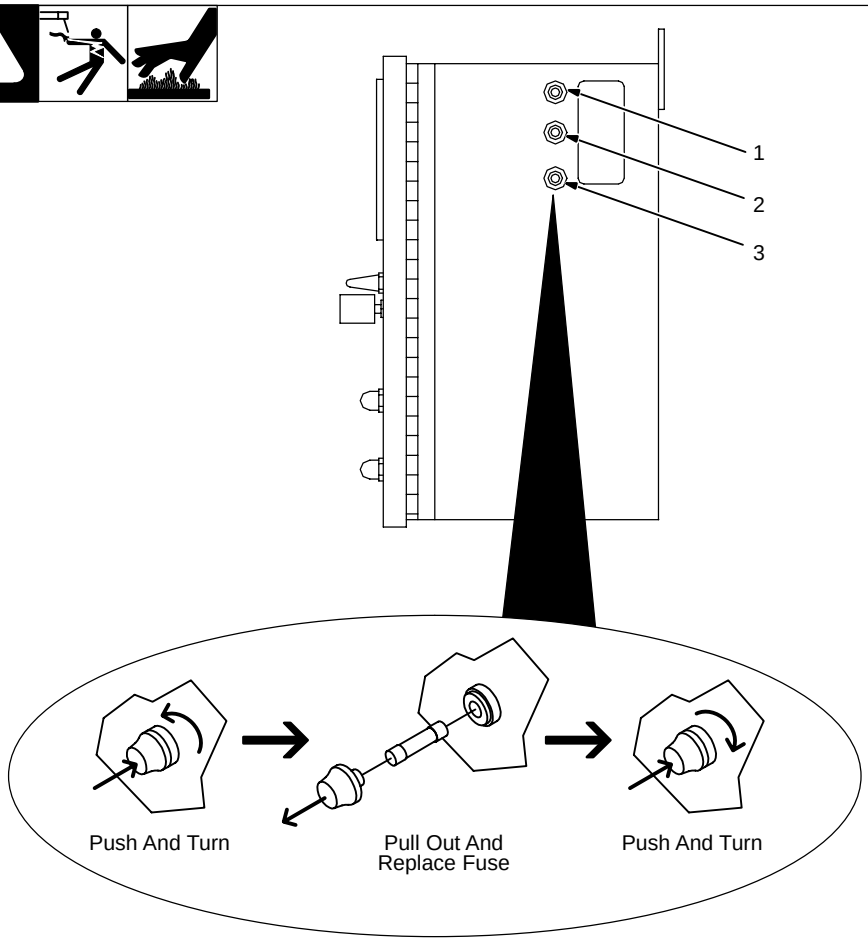


Clean drive rolls.



## 6-2. Replacing Fuses






**▲Turn Off welding power source and weld control.**

See Parts List for size and rating of fuses.

1 Fuse F1

Fuse F1 protects the wirefeed motor and motor drive board from overload. If Fuse F1 opens, the wirefeed motor stops. Check for jammed wire, binding drive gear, or misaligned drive rolls. Correct problem and replace F1.

2 Fuse F2

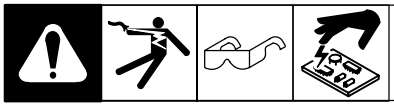
Fuse F2 protects the VL-M4 internal control circuits and the 115 vac supplied to pin A of 17-pin receptacle from overload. If F2 opens, all operation stops. Correct problem and replace F2.

3 Fuse F3

Fuse F3 protects the volt sense circuit from overload. If F3 opens, voltage feedback will be lost when using a constant current power source with the VL-M4 in the CC mode. Correct problem and replace F3.

Ref. 802 531

## 6-3. Troubleshooting Table



| Trouble | Remedy |
|---|---|
| Unit is completely inoperative. | Check fuses F1 and F2, and replace if necessary (see Section 6-2). |
| No wire feed during inching. | Place Power Switch S1 in On position (see Section 5-2). |
| | Check 115 volts ac input power and be sure it is energized. |
| | Check Fuses F1 and F2, and replace if necessary (see Section 6-2). |
| | Run-In Speed Control set too low; increase Run-In Speed setting (see Section 5-3). |
| | Check wire feed motor, and repair or replace if necessary. |
| | Check switches S1, PB3, PB4, and PB5, and replace if necessary (see Section 5-2 and Parts List). |
| | Check motor relay CR2 on Relay Board PC1, and replace CR2 if necessary (see Parts List). |
| | Have Factory Authorized Service Agent check Relay Board PC1 and Motor Drive Board PC2, and replace if necessary. |
| Wire feeds wrong direction during inching. | To change direction, reverse motor connections to terminals A and B on terminal strip TE2 if necessary. |
| Wire only feeds down whether Inch Down or Up button is pressed. | Check motor direction relay CR4 on Relay Board PC1, and replace CR4 if necessary (see Parts List). |
| No wire feed after Start button is pressed (ensure that all wire feed inching functions are operating properly before checking this problem). | Check Start switch PB2, and replace if necessary. |
| | Check weld latch relay CR5, and replace CR5 if necessary. |
| | Check time delay relay CR6, and replace if necessary. |
| | Check weld contactor relay CR3 on Relay Board PC1, and replace CR3 if necessary. |
| | Check burnback time delay relay TD1, and replace TD1 if necessary (see Parts List). |
| No wire feed speed control with Wire Speed control during welding, but speed can be controlled with Run-In speed control. | Check Wire Speed control R5, and replace if necessary. |
| | Check current sensing circuit in shunt box by checking for contact closure coming from shunt box to pins G and H on 17-pin receptacle of weld control. |
| | Have Factory Authorized Service Agent check motor board PC2, and replace if necessary. |
| No contactor control for welding power source (ensure that welding power source is working properly and that all connections are correct). | Check weld contactor relay CR3 on Relay Board PC1, and replace CR3 if necessary. |
| | Check weld latch relay CR5, and replace if necessary. |
| | Check time delay relay CR6, and replace if necessary. |
| No output control for welding power source. | Check Output control R4, and replace if necessary. |

# SECTION 7 – ELECTRICAL DIAGRAM

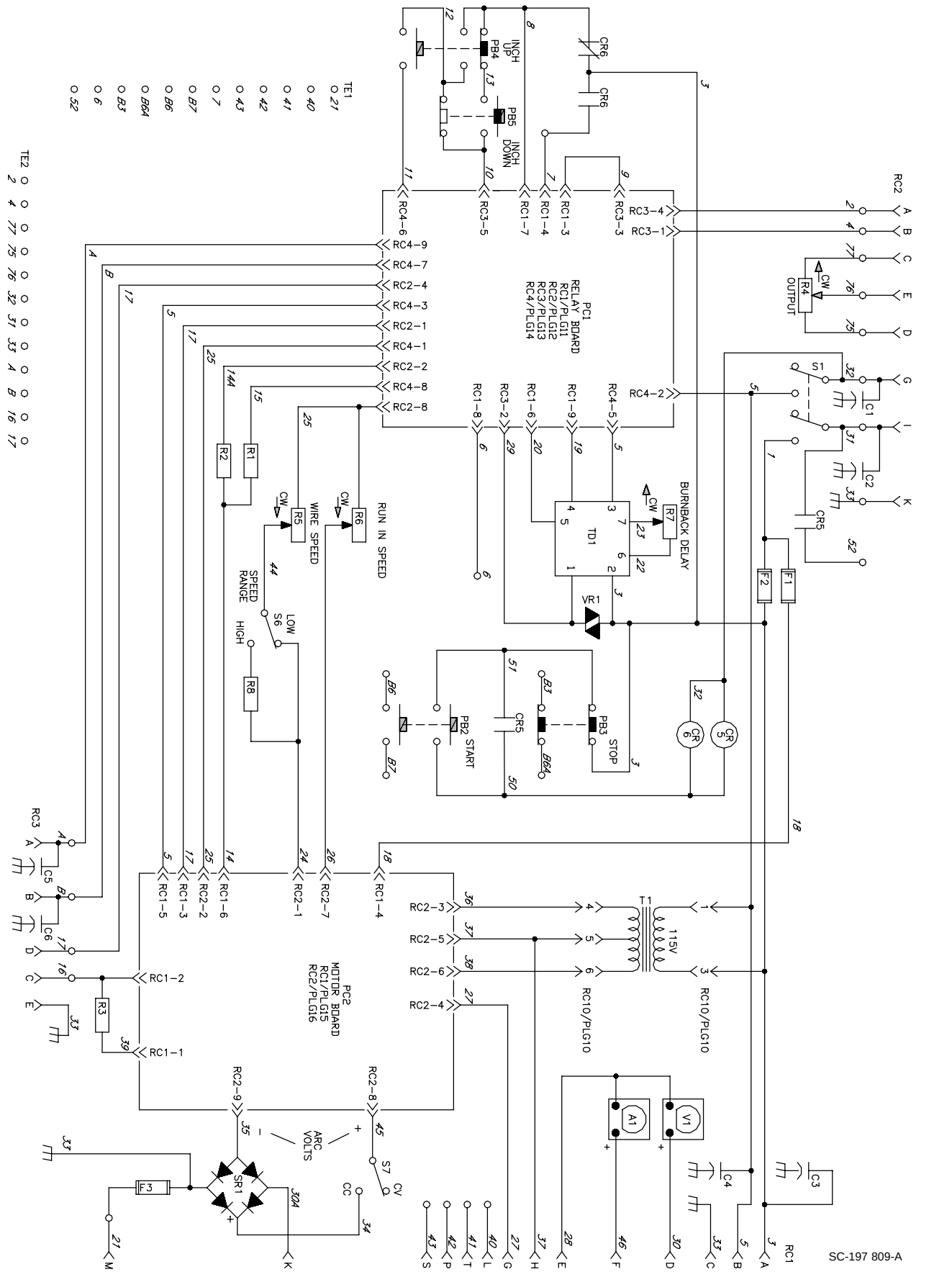
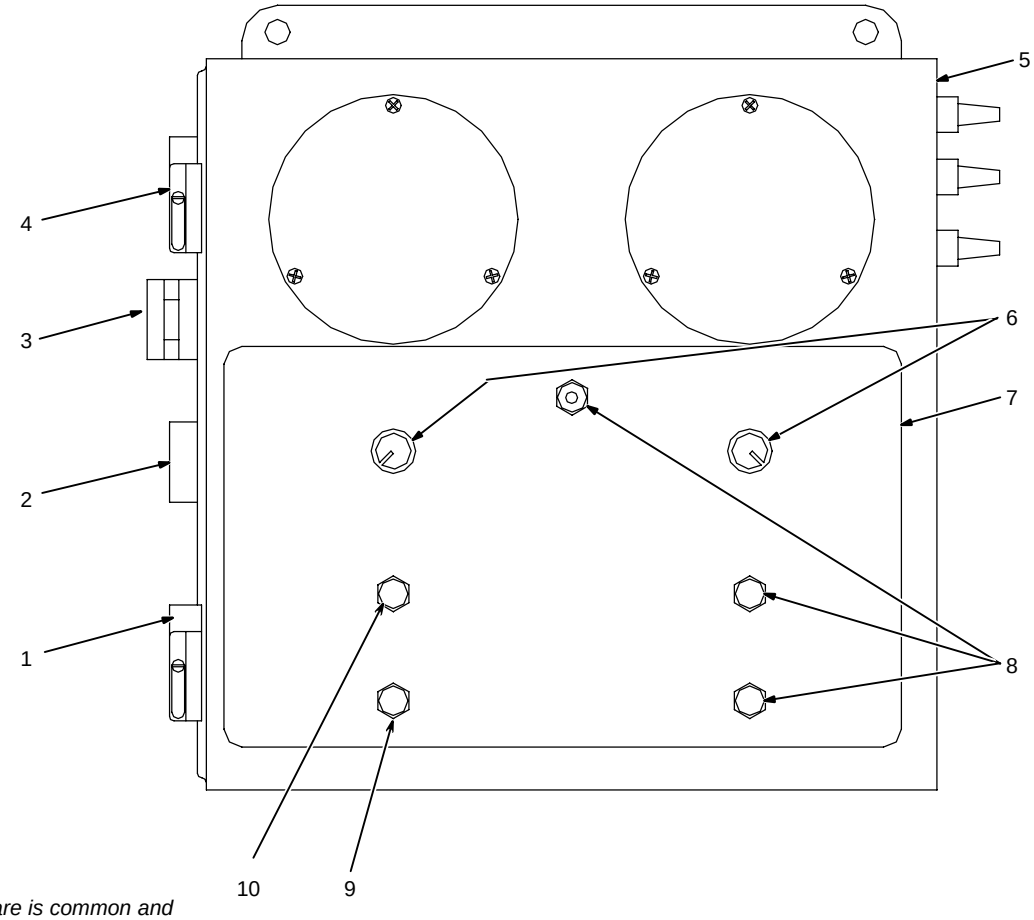



**Figure 6-1. Circuit Diagram**




*Hardware is common and not available unless listed.*

Ref. ST-802 531

**Figure 7-1. Control Box Components**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|
| **Figure 7-1. Control Box Components** | | | | |
| 1 | RC3 | 035 523 | CONNECTOR, circ MS/MET 5skt sz 16 | 1 |
| | C5, C6 | 134 426 | CAPACITOR, 0.1 uf | 2 |
| 2 | RC2 | 094 480 | CONNECTOR, circ MS/MET 14 pin sz 20 | 1 |
| | C1, C2 | 134 426 | CAPACITOR, 0.1 uf | 2 |
| 3 | | 190 635 | BUSHING, strain relief | 1 |
| 4 | RC1 | 097 869 | CONNECTOR, circ MS/MET 17skt sz 20 | 1 |
| | C3, C4 | 134 426 | CAPACITOR, 0.1 uf | 2 |
| 5 | | 194 618 | LABEL, replace with 5A 250V fuse | 1 |
| 6 | | 097 922 | KNOB, pointer .875dia x .250 ID | 2 |
| 7 | | 187 706 | NAMEPLATE, Miller VL-M4 | 1 |
| 7 | | 196 228 | NAMEPLATE, Miller VL-M4 (CE) | 1 |
| 8 | | 190 639 | SEAL, switch gray | 3 |
| 9 | | 190 640 | SEAL, switch red | 1 |
| 10 | | 190 638 | SEAL, switch black | 1 |

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

*Hardware is common and not available unless listed.*

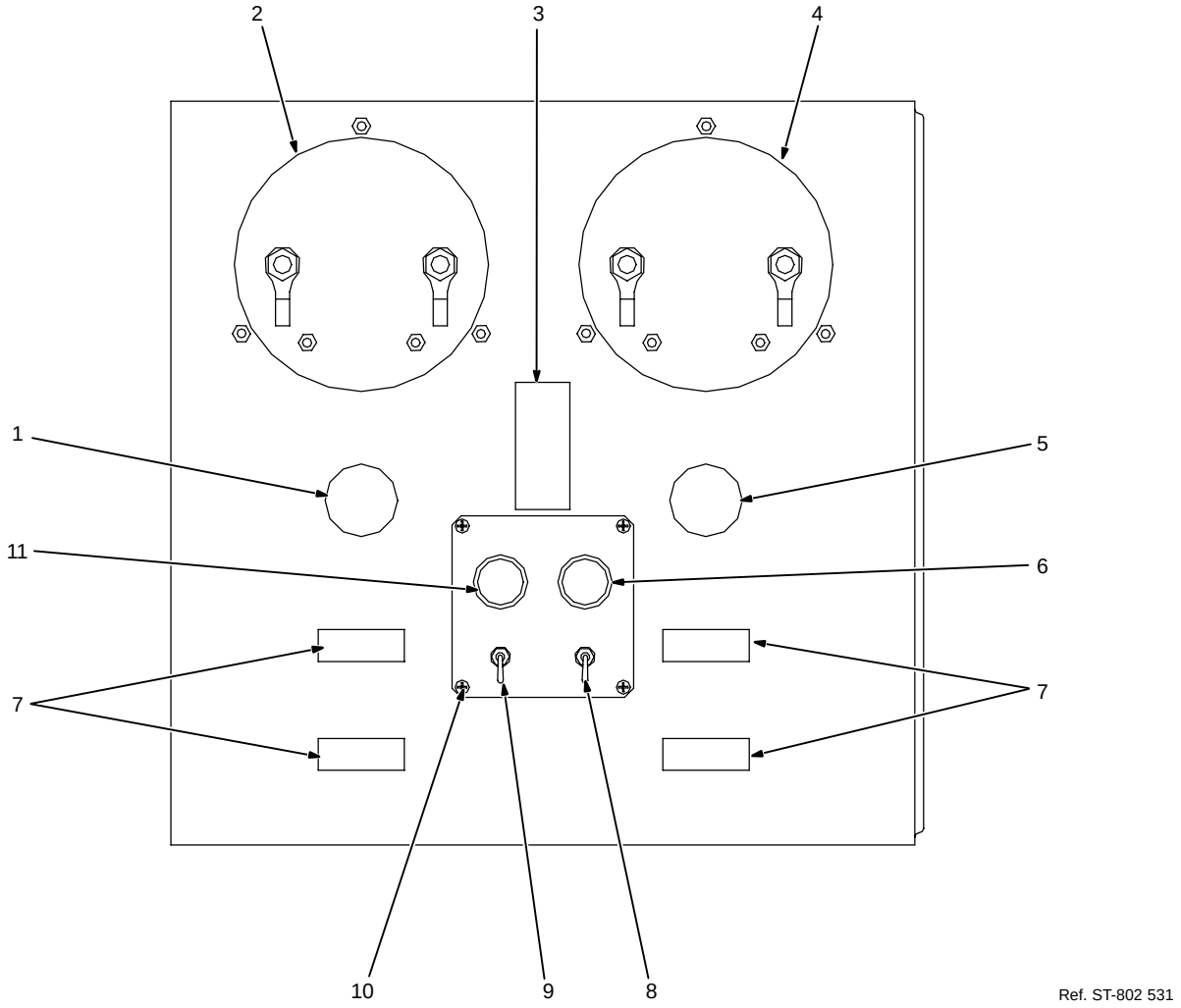



**Figure 7-2. Inside Access Door Components**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|
| | | | **Figure 7-2. Inside Access Door Components** | |
| 1 | R5 | 030 109 | POTENTIOMETER, CP std slot 1T 2W 5K ohm | 1 |
| 2 | A1 | 190 628 | METER, amp 2V 0–1500 scale 3.5 in | 1 |
| 3 | S1 | 190 627 | SWITCH, tgl DPST 6A 125V panel | 1 |
| 4 | V1 | 190 629 | METER, volt 2V 0–100 scale 3.5 in | 1 |
| 5 | R4 | 035 897 | POTENTIOMETER, CP std slot 1T 2W 1K ohm | 1 |
| 6 | | 190 642 | KNOB, pointer .625dia x .250 ID | 1 |
| | R7 | 028 769 | POTENTIOMETER, CP std slot 1T 2W 750K ohm | 1 |
| 7 | PB2–PB5 | 190 626 | SWITCH, PB MC DPDT 6A 125V panel | 4 |
| 8 | S7 | 190 630 | SWITCH, tgl SPDT 5A 125V on-none-on | 1 |
| 9 | S6 | 190 630 | SWITCH, tgl SPDT 5A 125V on-none-on | 1 |
| | R8 | 108 432 | RESISTOR, MF .25W 2.21K | 1 |
| 10 | | 189 225 | PLATE, control run-in/burn back | 1 |
| 10 | | 196 230 | PLATE, control run-in/burn back (CE) | 1 |
| 11 | | 190 642 | KNOB, pointer .625dia x .250 ID | 1 |
| | R6 | 030 109 | POTENTIOMETER, CP std slot 1T 2W 5K ohm | 1 |

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

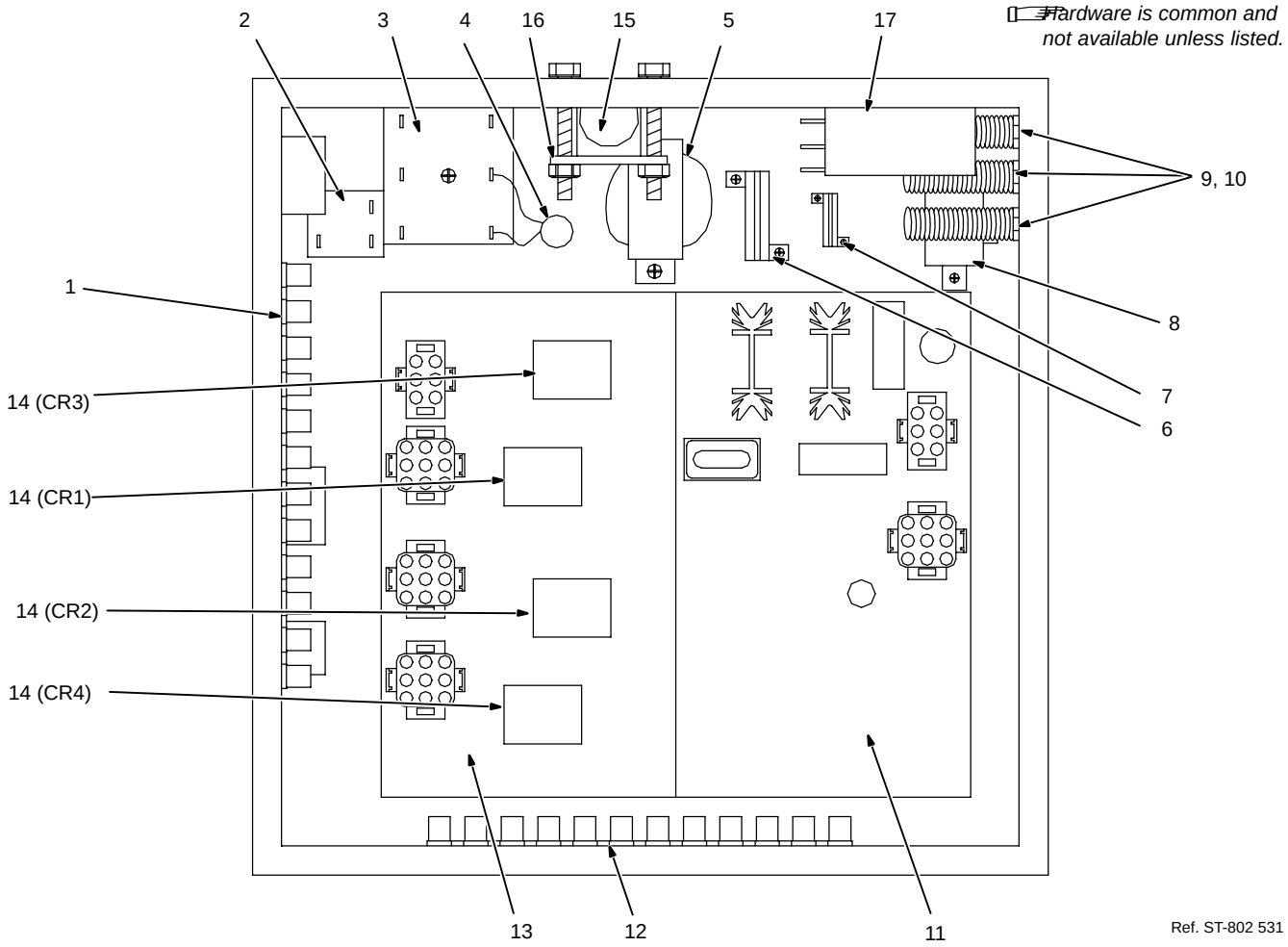



**Figure 7-3. Case Section w/Components**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|
| | | | **Figure 7-3. Case Section w/Components** | |
| 1 | TE1 | 188 719 | BLOCK, term 40 amp 12 pole screw | 1 |
| | | 189 130 | LABEL, term mkg 40 amp blk 12 | 1 |
| 2 | SR1 | 190 637 | RECTIFIER, bridge 10A 400V | 1 |
| 3 | TD1 | 190 646 | TIMER, delay on break .05 to 3 sec | 1 |
| 4 | VR1 | 046 685 | VARISTOR, 200V 35 joule | 1 |
| 5 | T1 | 190 641 | TRANSFORMER, control 115V pri 24VCT | 1 |
| 6 | R3 | 190 645 | RESISTOR, WW fxd 50W 50 ohm | 1 |
| 7 | R2 | 190 644 | RESISTOR, WW fxd 25W 2 ohm | 1 |
| 8 | R1 | 190 636 | RESISTOR, WW fxd 30W 1 ohm | 1 |
| 9 | | 046 432 | HOLDER, fuse mintr .250 x 1.250 | 3 |
| 10 | F1, F2, F3 | *073 426 | FUSE, mintr gl 5A 250V | 3 |
| 11 | PC2 | 190 632 | CIRCUIT CARD ASSEMBLY, motor control | 1 |
| 12 | TE2 | 188 719 | BLOCK, term 40 amp 12 pole screw | 1 |
| | | 189 129 | LABEL, term mkg 40 amp blk 12 | 1 |
| 13 | PC1 | 190 633 | CIRCUIT CARD ASSEMBLY, relay | 1 |
| 14 | CR1,2,3,4 | 190 822 | RELAY, ENCL 120 VAC, DPDT 7.5A/120VAC | 4 |
| 15 | CR6 | 198 427 | RELAY, delay adj 120 VAC DPDT 0-10 min 8-pin plug-in | 1 |
| 16 | | 197 811 | PLATE, mounting relay | 1 |
| 17 | CR5 | 059 266 | RELAY, encl 120 VAC DPDT 10A/120VAC | 1 |

*Recommended Spare Parts.

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|---|---|---|---|---|
| | | **188 627** | **Figure 7-4 . Shunt Control** | |
| 1 | Shunt | 072 425 | SHUNT, meter 50 MV 1500A | 1 |
| 2 | | 083 084 | SHIELD, heat | 1 |
| 3 | | +083 086 | WRAPPER | 1 |
| 4 | | 134 464 | LABEL, warning general precautionary | 1 |
| 5 | | 073 756 | STAND-OFF, No. 6-32 x .625 | 4 |
| 6 | | 114 426 | HOUSING, term header 16 pin | 1 |
| 7 | PC1 | 186 752 | CIRCUIT CARD, meter converter | 1 |
| 8 | T2 | 035 759 | TRANSFORMER, control 115/36 | 1 |
| 9 | | 083 085 | BRACKET, mtg components | 1 |
| 10 | | 083 083 | BRACKET, mtg control | 2 |
| 11 | | 601 158 | BLANK, snap-in 7/8 inch | 4 |
| 12 | | 083 087 | CONTROL BOX, shunt | 1 |
| 13 | RC7 | 189 032 | CONNECTOR W/LEADS | 1 |
| 14 | | 025 248 | STAND-OFF, 1/4-20 x 1-1/4 | 4 |
| 15 | | 083 082 | BUS BAR, jumper | 2 |

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

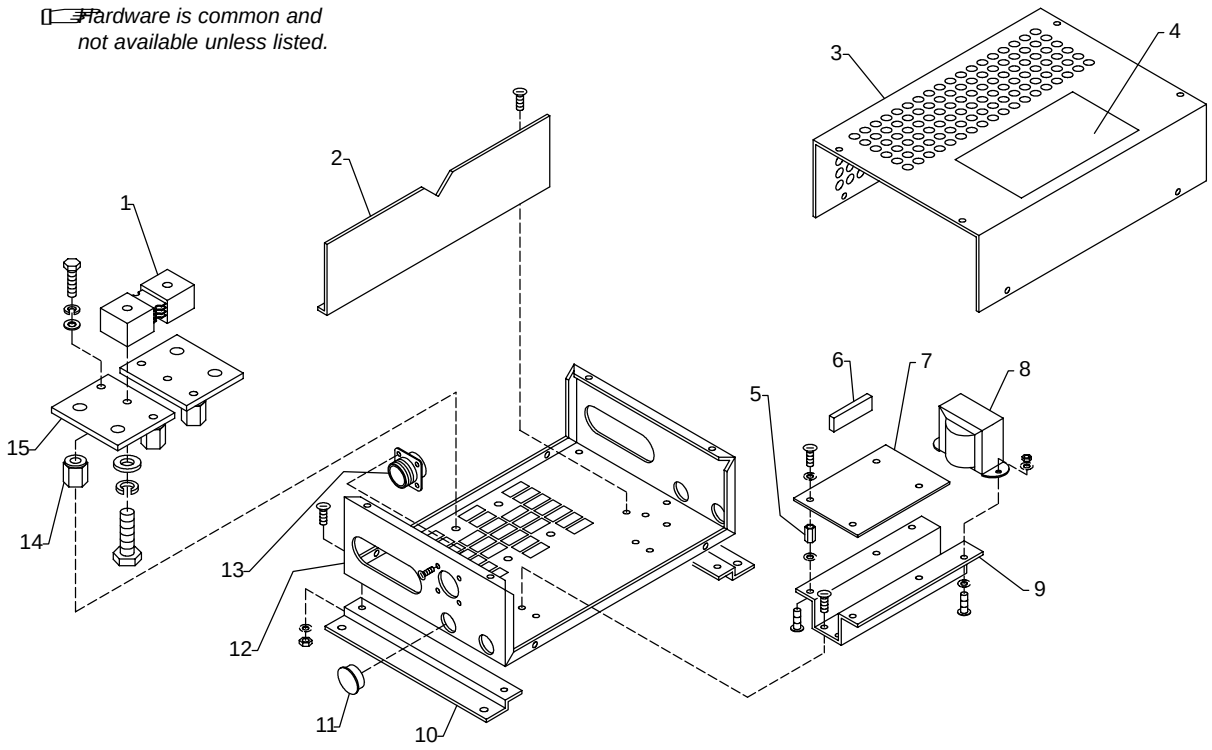



**Figure 7-4. Shunt Control**

*Warranty Questions?*

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for your local
Miller distributor.

Your distributor also gives you ...

**Service**
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

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Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller
*The Power of Blue.*

# TRUE BLUE® WARRANTY

## Effective January 1, 2000
## (Equipment with a serial number preface of "LA" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

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# Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

Purchase Date (Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

# For Service

***Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.***

Always provide Model Name and Serial/Style Number.

| | |
|---|---|
| Contact your Distributor for: | Welding Supplies and Consumables |
| | Options and Accessories |
| | Personal Safety Equipment |
| | Service and Repair |
| | Replacement Parts |
| | Training (Schools, Videos, Books) |
| | Technical Manuals (Servicing Information and Parts) |
| | Circuit Diagrams |
| | Welding Process Handbooks |
| Contact the Delivering Carrier for: | File a claim for loss or damage during shipment. |
| For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department. | |

**Miller Electric Mfg. Co.**
An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

**International Headquarters–USA**
USA Phone: 920-735-4505 Auto-Attended
USA & Canada FAX: 920-735-4134
International FAX: 920-735-4125

**European Headquarters – United Kingdom**
Phone: 44 (0) 1204-593493
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